6520-01-287-8123

DENTAL FIELD LIGHT UNIT

Light Fantastic® II

Service Manual

FOR MODELS
LF II, LFT II, LFT II-D,
LFC II, LFC II-D, LFW II, LFL II

Pelton & Crane

TABLE OF CONTENTS

SECTION 1 – OPERATING CAPABILITIES

I. LIGHT PATTERN

The Light Fantastic II light pattern is 3″ (7.6 cm) high x 8″ (20.3 cm) wide, and is factory focused at 27″ (68.6 cm) with an excellent pattern range between 18″ (45.7 cm) and 36″ (91.4 cm). The light can be refocused as desired. The pattern shape remains constant throughout the range of operating distances, with no pattern separation. The correlated color temperature is between 3600° K and 4300° K.

II. REFLECTOR

The back surface coating, which diffuses light emitting from the back of the reflector, is a ceramic material (frit) fused into the glass which will not peel. The dichroic coating on the front surface reflects visible energy (light), but allows infrared and ultraviolet energy to pass through. This coating also controls color of light.

III. LAMP

A bulb life of 8000 hours is average expectation for this quartz–halogen type lamp. Nominal intensity range is from 1500 FC (low setting), to 2500 FC (high setting).

IV. DRIFT–FREE ARM

A gas spring (rather than compensation coil springs) provides reliable and safe drift–free arm movement.

SECTION 2 - TROUBLESHOOTING PROCEDURES

Table 2-1. TROUBLESHOOTING PROCEDURES

SYMPTOM	TROUBLE	REMEDY
Light will not operate.	Switch is off.	Turn switch on.
	Lamp burned out. Resistance of lamp should be 0.3 ohms. Solid black coating on inside of lamp or broken filament are indicative of lamp failure.	Replace lamp.
	Lamp not seated correctly on contacts.	Seat lamp. Rotate lamp back and forth to ensure correct seating.
	Fuse blown. (Track light only.)	Replace fuse.
	Power not available. Refer to Section 3-I or 3-II.	Provide power.
	Transformer failure. Refer to Section 3-III.	Replace transformer.
	Phase control dimmer circuit failure. Refer to Section 3-IV.	Replace phase control dimmer circuit.
	Dimmer failure. To test: make a connection between blue wire and orange wire. If light comes on, dimmer is defective.	Replace dimmer.
	Broken wire or loose connection. Refer to Section 3-I or 3-II.	Replace broken wire or improve connection.
Handles are hot.	Light on and pointed toward ceiling when not in use.	Point light down and/or turn off when not in use.
	Handles are touching frame.	Replace handle and/or handle insulators to provide 1/16" gap all around between handle and frame.
	Voltage too high.	Check voltage. Refer to Section 3-I or 3-II.
Reflector clamp will not snap closed.	Not pushing hard enough.	Push with thumb while gripping handle with fingers.
	Hinge has moved.	Loosen (do not remove) hinge screws and adjust position with release pin in slotted hole.
	Needs oiling.	Lightly oil release pin.

Table 2-1. (Cont.)

SYMPTOM	TROUBLE	REMEDY
Light too dim.	Dimmer switch on low setting.	Turn switch to higher setting.
	Dirty reflector and/or shield.	Clean reflector and shield (Reflector Cleaning Kit no. 017134.)
	Lamp turning dark.	Replace lamp.
	Voltage too low.	Check voltage. Refer to Section 3-I or 3-II.
Light too bright.	Dimmer switch on high setting.	Turn switch to lower setting.
	Voltage too high.	Check voltage. Refer to Section 3-I or 3-II.
Lamp life too short.	Cheaper and/or inferior lamps on market.	Use only Pelton & Crane lamps, Q150T4/CL/PC/25V.
	Voltage too high.	Check voltage. Refer to Section 3-I or 3-II.
Light blinks.	Corroded contacts.	Clean contacts with sandpaper.
	Broken or frayed wire.	Replace wire. Refer to Section 3-VI.
Unsatisfactory light pattern.	Out of focus.	Focus light. Refer to Section 3-V.
	Exhaust tip on lamp pointing toward reflector.	Turn lamp so exhaust tip points **away** from reflector.
Light pattern not "square" with patient's mouth.	Mounting post not plumb.	Plumb mounting post.
	Yoke bent.	Straighten or replace yoke.
Head drifts in yoke.	Pivot bushings loose.	Tighten pivot bushings. Refer to Installation and Adjustment Instructions, YL3-096035, paragraphs 2.19 through 2.24.
Front arm drifts up.	Gas spring not properly adjusted.	Using 5/16" x 9" long allen wrench or Pelton & Crane tool (016207), reduce force by turning counterclockwise. Refer to Installation and Adjustment Instructions, YL3-096035, paragraphs 2.25 through 2.33.

Table 2–1. (Cont.)

SYMPTOM	TROUBLE	REMEDY
Front arm drifts down.	Insufficient force on gas spring.	Using gas tool, increase force by turning clockwise. Using 5/16" x 9 " long allen wrench or Pelton & Crane tool (016207), reduce force by turning counterclockwise. Refer to Installation and Adjustment Instructions, YL3–096035, paragraphs 2.25 through 2.33.
	Gas spring defective.	Replace gas spring. Refer to Section 3–VI.
Arm drifts to side.	Mounting post not plumb.	Plumb mounting post.
	Loose snubbing pins or friction joints.	Tighten pins and joints. Refer to Installation and Adjustment Instructions, YL3–096035, Section 2.
Friction joints constantly need tightening.	Mounting post not plumb.	Plumb mounting post.
	Loose set screws at joints.	Tighten set screws. Refer to Installation and Adjustment Instructions, YL3–096035, Section 2.

SECTION 3 – GENERAL SERVICE INFORMATION

I. TRACE VOLTAGE ON TRACK LIGHT (systematically troubleshoot if track light will not come on.)

A. Remove transformer cover. Measure voltage across terminals marked "C" and "H". (Refer to appropriate wiring diagram in Section 4.) Line voltage (120 VAC or 240 VAC) should be present. If not present, proceed to Section 3–I–B. If line voltage is present, proceed to Section 3–I–C.

WARNING: Line voltage (120 VAC or 240 VAC) present on exposed wiring.

B. Measure voltage between incoming power lines (black and white wires) at wire nuts. If voltage is present, fuse is blown. If voltage is not present, the problem is external to the light. Check circuit breakers.

C. Measure voltage across secondary terminals marked "0" and "25". If not 25 VAC (light burning) or 27 VAC (light not burning), transformer is bad. If voltage is present, proceed to Section 3–I–D.

D. Remove wire nuts at points 1 and 2 (located inside post knuckle). (Refer to appropriate wiring diagram in Section 4.) Attach a 4 ohm, 200 watt (or larger) resistor between yellow wires 1 and 2 and measure 25 VAC. If voltage is present, proceed to Section 3–I–F. If voltage is not present, short orange and blue wires together. If 25 VAC is present at 1 and 2 with wires shorted, dimmer is defective and should be replaced. If 25 VAC is not present, proceed to Section 3–I–E.

NOTE: If column has roll pin already installed, roll pin must be removed before disassembling.

WARNING: Disconnect electrical power supply while disassembling. Failure to disconnect electrical power may result in electrical shock.

E. Use 1/8″ pin punch to drive roll pin inside column.

F. Remove light from column by removing set screw and stop screw, and unscrew arm mounting collar counterclockwise as viewed from below (**Figure 1**). Pull phase control out of column. If roll pin was driven into column, locate and discard it. Disconnect Mate–n–Lok® connector and measure voltage at pins 3 and 4. If 27 VAC is present, phase control is defective and should be replaced. If 27 VAC is not present, wires are broken or connector is loose between transformer and bottom of column. Check and replace as necessary. After completing checks, reinstall light on column.

NOTE: When reinstalling column or column adapter, realign hole and replace roll pin. If realignment is not possible, redrill hole using supplied sleeved drill bit. Always use a new roll pin to ensure safe installation.

G. Order Light Fantastic® Column Installation Instructions (with roll pin), kit no. 025182.

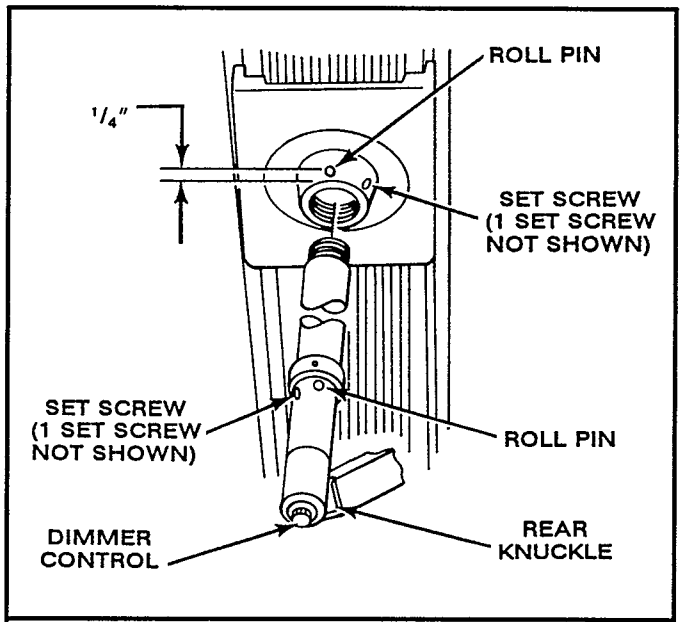


FIGURE 1 – REMOVING LIGHT FROM COLUMN

H. Remove resistor and reattach yellow wires to black wires. Remove yoke cap and measure 27 VAC across points 5 and 6. If no voltage is present, wire in front arm is broken and (both) should be replaced. If 27 VAC is present, proceed to Section 3–I–I.

I. Measure voltage between points 5 and 7. If no voltage is present, ON/OFF switch is defective and should be replaced. If 27 VAC is present, proceed to Section 3–I–J.

J. Remove lamp. Measure voltage across socket contacts. If 27 VAC is present, lamp is defective or contacts are corroded, and should be replaced or cleaned. If no voltage is present, proceed to Section 3–I–K.

K. Wire from socket is broken. Replace both sockets.

II. TRACE VOLTAGE ON ALL OTHER MODELS (systematically troubleshoot if light will not come on.)

A. Measure voltage between points 1 and 2. (Refer to appropriate wiring diagram, Section 4.) If voltage (25/23/21/19 VAC) is present, proceed with Section 3–II–B. If no voltage is present, proceed to Section 3–II–F.

B. **For LFLII, LFWII (2), LFWII (3) only:** Measure for (25/23/21/19 VAC) between points 3 and 4 (located inside post knuckle). If voltage is present, proceed to Section 3–II–C. If no voltage is present, wires between 1/2/3/4 are broken and should be replaced.

C. Measure (25/23/21/19 VAC) between points 5 and 6. If voltage is present, proceed to Section 3–II–D. If no voltage is present, wires in front arm are broken and should be replaced.

D. Measure (25/23/21/19 VAC) between points 6 and 7. If voltage is present, proceed to Section 3–II–E. If no voltage is present, switch is defective and should be replaced.

E. Measure (25/23/21/19 VAC) between points 8 and 9. If voltage is present, lamp is defective or contacts are corroded and should be replaced or cleaned. If no voltage is present, socket or socket wires are defective. Replace both sockets.

F. Measure 120 VAC between points 10 and 11. If voltage is present, proceed to 3–II–G. If no voltage is present, proceed to 3–II–H.

G. Remove transformer and switch. Check continuity between L and 1, L and 2, and L and 3 with switch turned to H, M, L of **disconnected** switch. Continuity proves switch is good and indicates transformer is defective, or switch is defective and transformer is good. Measure resistance between terminals 1 and 2 (with transformer **disconnected**), which should be approximately 0.1 ohms. Infinite ohms indicate bad transformer. Measure resistance between white and red lead of **disconnected** transformer, which should be approximately 1 ohm. Infinite ohms indicate a bad transformer.

H. **For LFII, LFLII, LFWII (2) and LFWII (3),** a power problem exists which is external to the light. (Check circuit breakers.) **For LFCII or LFCII–D,** the problem could also be in wiring through column. Measure voltage between points 12 and 13. If line voltage (120 VAC or 240 VAC) is present, the problem is in the wiring in column. If no voltage is present, the problem is external to light. (Check circuit breakers.)

III. TEST TRANSFORMER

A. Track Light

Remove transformer cover. Measure voltage across terminals marked "C" and "H". (Refer to appropriate wiring diagram in Section 4.) Line voltage (120 VAC or 240 VAC) should be present. Measure voltage across secondary terminals marked "0" and "25". Voltage should read 25 VAC (light burning) or 27 (light not burning).

B. Other Models

Remove transformer and switch. Check continuity between L and 1, L and 2, and L and 3 with switch turned to H, M, L of **disconnected** switch. Continuity proves either switch or transformer is defective. Measure resistance between terminals 1 and 2 (with transformer **disconnected**) which should be 0.1 ohms. Infinite ohms indicate defective transformer. Measure resistance between white and red lead of **disconnected** transformer, which should be 1 ohm. Infinite ohms indicate defective transformer.

IV. TEST PHASE CONTROL DIMMER CIRCUIT

A. Remove wire nuts from points 1 and 2 located in post knuckle. (Refer to appropriate wiring diagram in Section 4.) Attach a 4 ohm, 200 watt (or larger) resistor between yellow wires 1 and 2 and measure 25 VAC. If voltage is not present, short orange and blue wires together. If 25 VAC is present with wires shorted, dimmer is defective. If 25 VAC is not present either way, and power is available at the transformer, secondary phase control dimmer circuit is defective.

V. Focus Light

NOTE: The lamp focus is factory set for an optimum pattern 27″ (68.6 cm) from the oral cavity. This results in an excellent pattern in an 18″ (45.7 cm) to 36″ (91.4 cm) range from the oral cavity. The lamp may be refocused for an optimum pattern at other operating distances.

A. Turn two screws on front of light (**Figure 2**) clockwise until both screws are tight. The patterns will now be partially overlapped as shown in Pattern A, **Figure 3.**

B. Turn each screw counterclockwise equally one turn at a time until the patterns are superimposed as shown in Pattern B, **Figure 3.**

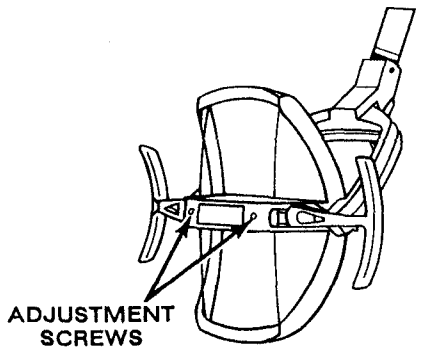


FIGURE 2 - ADJUSTMENT SCREWS FOR FOCUSING LAMP

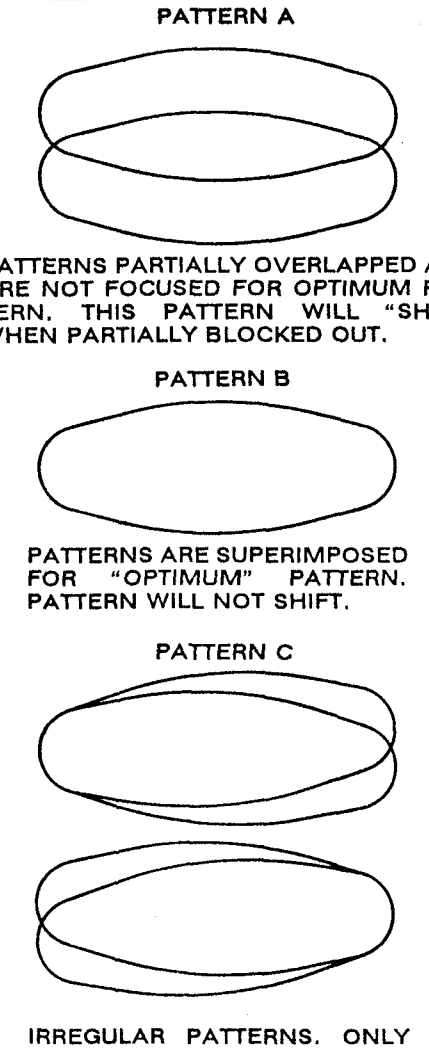


FIGURE 3 - FOCUSING LAMP PATTERNS

C. Inspect for optimum pattern by blocking out one half of the light. If the pattern shifts, further adjustment is required. Otherwise, focusing of the lamp is completed.

D. If patterns are irregular as shown in Pattern C, **Figure 3**, turn only one screw until the patterns are superimposed.

VI. REPLACE GAS SPRING IN UNIT MOUNT LIGHT

A. Disconnect all power to light.

B. Disassemble light yoke by removing four screws **(Figure 4)**.

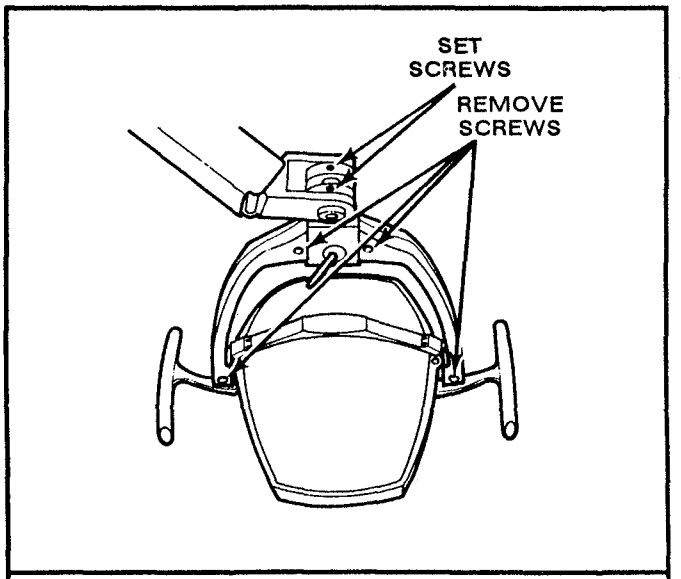


FIGURE 4 - TO DISASSEMBLE

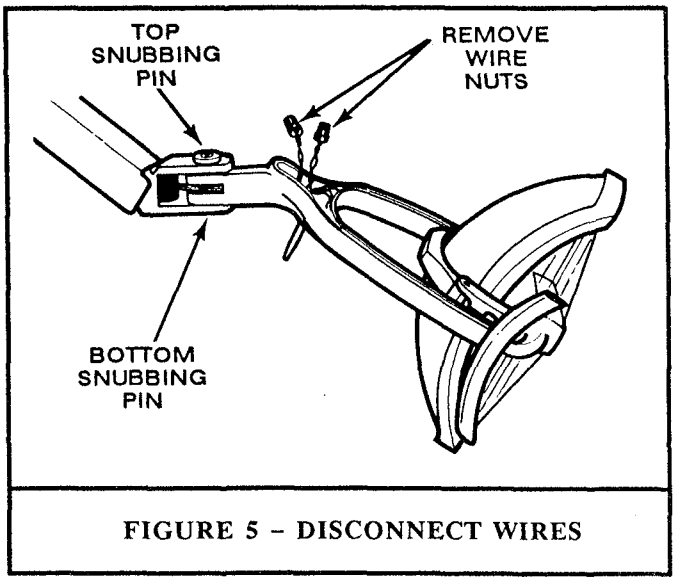


FIGURE 5 - DISCONNECT WIRES

C. Locate and remove two wire nuts from wires leading from front arm (**Figure 5**).

D. Pop out knuckle cover, pull wires back through slot, and remove plastic sleeve (**Figure 6**).

NOTE: Examine position of wiring for reassembly.

E. Remove position screw (**Figure 7**), allowing joint to straighten. Pull slack wire from rear arm, pop out second knuckle cover (**Figure 8**), and pull out wires from front arm.

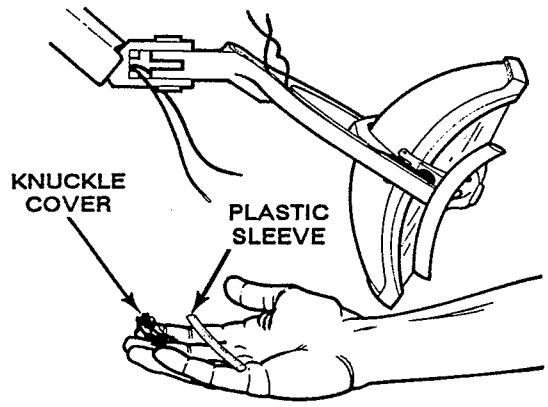


FIGURE 6 - REMOVING WIRING

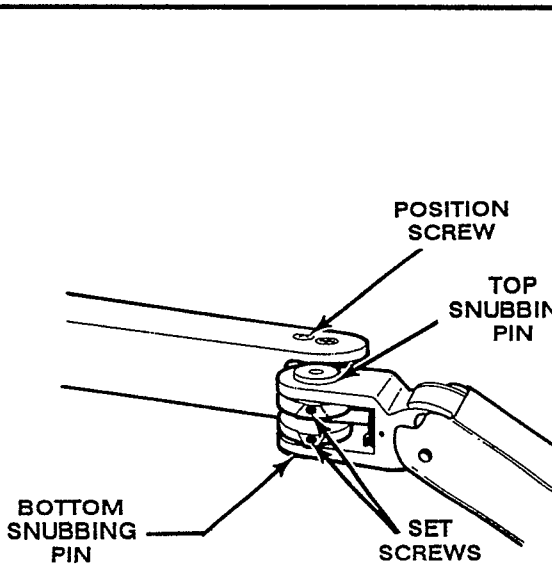


FIGURE 7 - REMOVING POSITION SCREW

F. Loosen two allen screws (**Figure 9**) by turning counterclockwise.

G. Remove top and bottom snubbing pins, springs and washers using allen or hex wrench (**Figure 10**), and remove light head.

H. Insert gas tool into rear of arm and turn counterclockwise until arm tension is relieved (pressure is released), plus four extra turns (**Figure 11**).

WARNING: **Ensure pressure has been released from gas spring.**

I. Remove four screws from underside of arm (**Figure 12**).

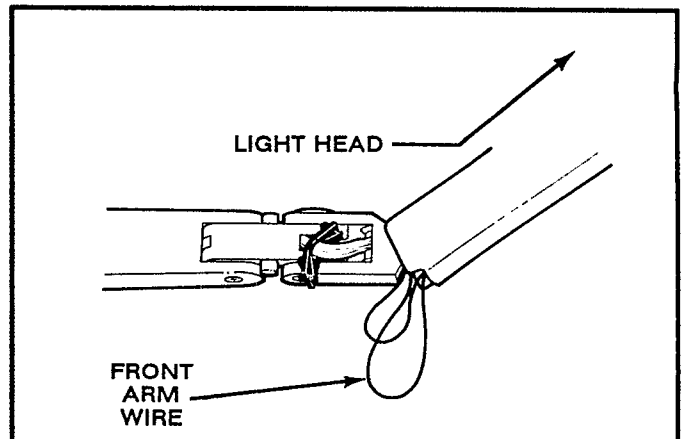


FIGURE 8 - PULL WIRES OUT HERE

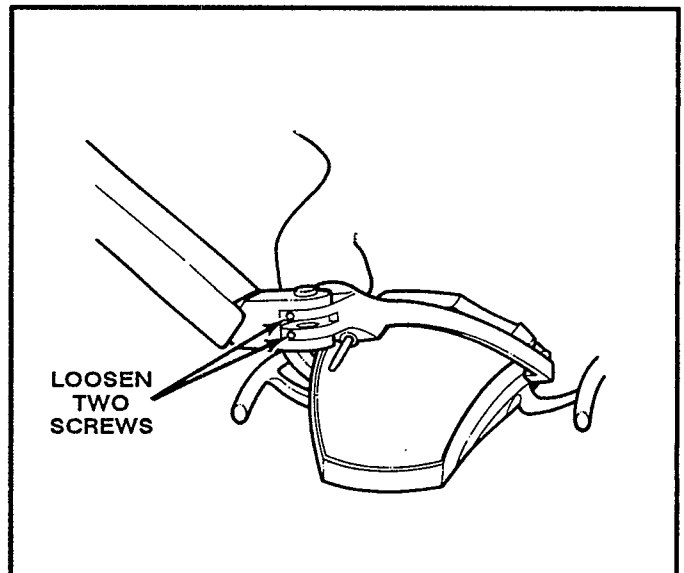


FIGURE 9 - LOOSENING ALLEN SCREWS

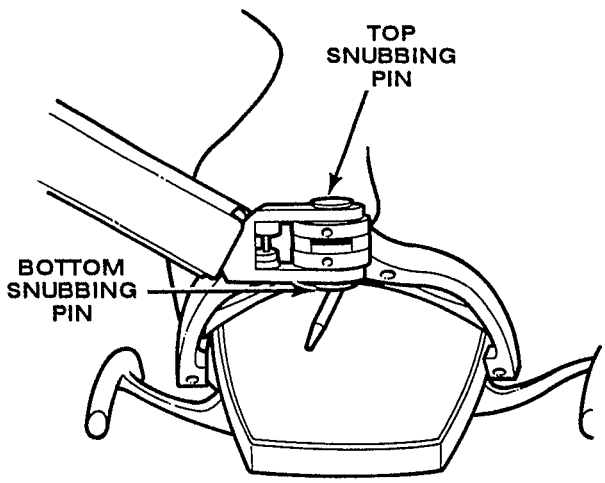


FIGURE 10 – REMOVING LIGHT HEAD

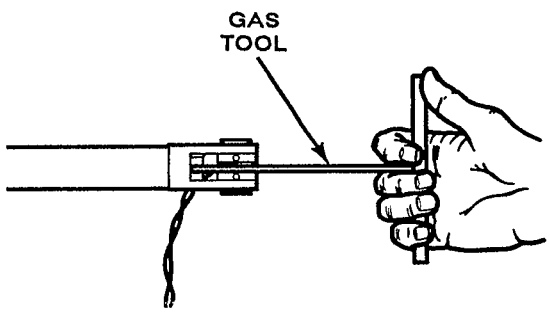


FIGURE 11 – ADJUSTING PRESSURE ON GAS SPRING

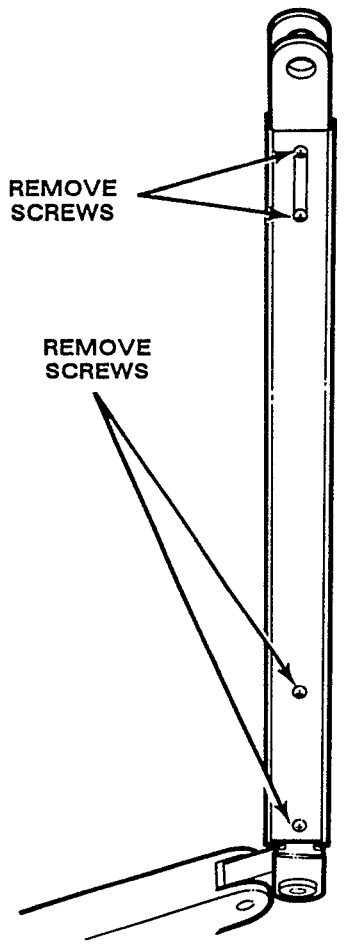


FIGURE 12 – DISASSEMBLING ARM

J. Punch out pin using pin punch, as shown in **Figure 13**, and remove knuckle.

NOTE: Pin is designed to permit removal or insertion in one direction only. Push from side with flats on pin.

K. Slip cover off front of arm and replace gas spring (**Figure 14**).

L. Replace arm cover, knuckle and pin. Press arm down to install two front screws. Hold arm up to install two rear screws (**Figures 15 and 16**).

CAUTION: **All four screws on underside of arm must be torqued to 40-inch pounds.**

M. Insert gas tool into rear of arm (**Figure 11**) and turn clockwise 16 revolutions.

N. Remount light head.

NOTE: Flat side of snubbing pins should face allen screws.

O. Place yoke cap on yoke and check balance of light. Adjust (using gas tool) if necessary.

NOTE: Equal force (or up to twice as much force DOWN) should be required to move light up or down.

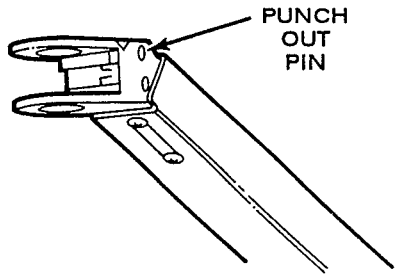


FIGURE 13 - REMOVING PIN

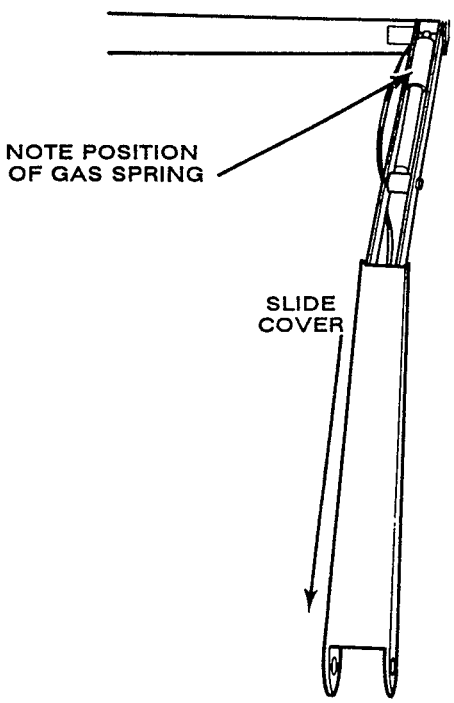


FIGURE 14 - REMOVING COVER

P. Route wires back through arm (as previously installed, ensuring wires are in channels) to head, replacing plastic sleeve and knuckle cover. Do not pinch wires.

CAUTION: **Inspect rewiring carefully to pevent damage to wire, especially at arm joints.**

Q. Replace position screw (**Figure 7**).

VII. REPLACE GAS SPRING IN COLUMN MOUNT LIGHT

A. Disconnect all power to light.

B. Disassemble light yoke by removing four screws (**Figure 17**).

C. Locate and remove two wire nuts from wires leading from front arm (**Figure 17**).

D. Remove light head with arm by removing two screws at top of arm joint (**Figure 18**).

NOTE: Examine position of wiring for reassembly.

E. Pull wires up through arm and leave as shown in **Figure 19**. Remove position screw, allowing joint to straighten. Pop out knuckle cover to permit access to rear of arm.

F. Insert gas tool (provided) into rear of arm (refer to **Figure 21** for gas tool insertion), and turn counterclockwise until arm tension is relieved (pressure is released), plus four extra turns.

WARNING: **Ensure pressure has been released from gas spring.**

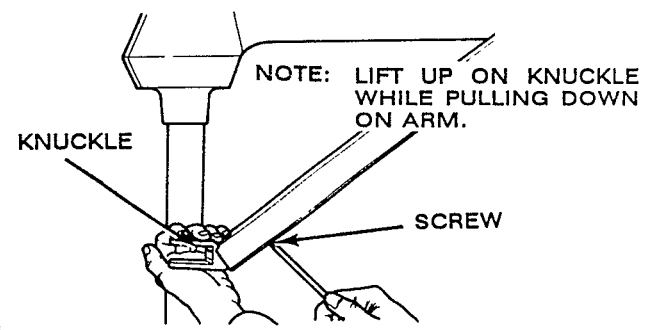


FIGURE 15 - INSTALLING TWO FRONT SCREWS

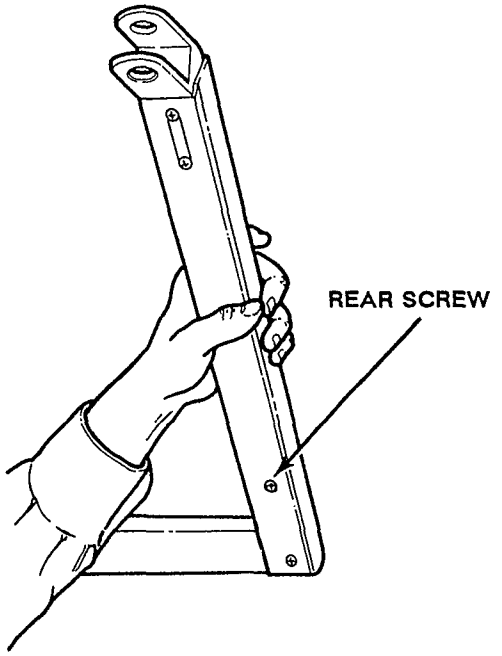


FIGURE 16 - LIFT UP TO INSTALL REAR SCREWS

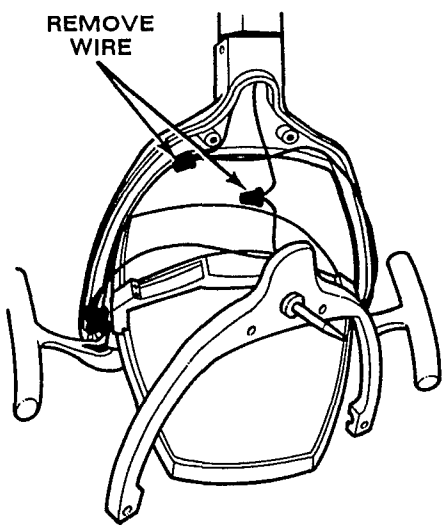


FIGURE 17 - DISCONNECT WIRES

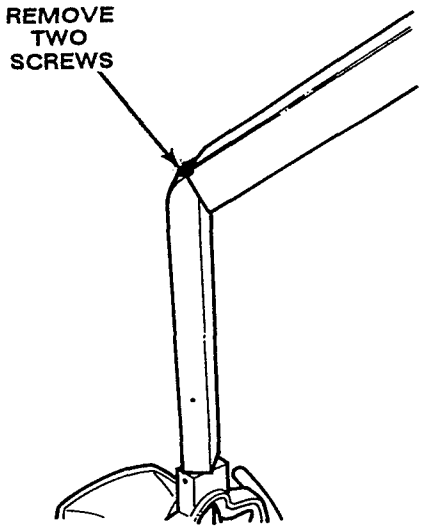


FIGURE 18 - REMOVING LIGHT HEAD AND ARM

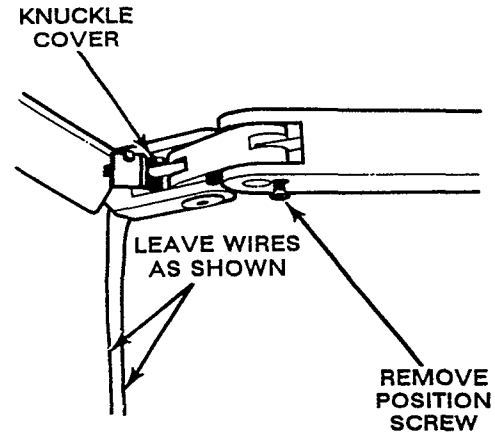


FIGURE 19 - REMOVING POSITION SCREW

G. Remove four screws from underside of arm (**Figure 12**).

H. Punch out pin and remove knuckle (**Figure 20**).

NOTE: Pin is designed to permit removal or insertion in one direction only. Push from side with flats on pin.

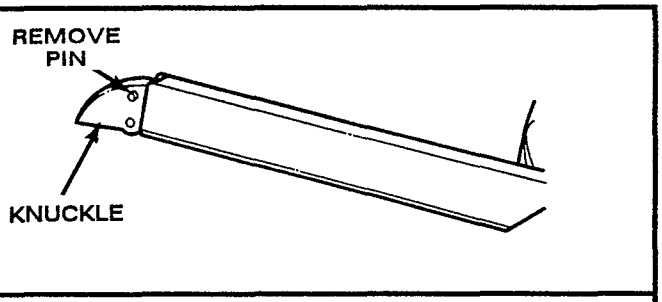


FIGURE 20 - DISASSEMBLING ARM

I. Perform procedure in Section 3-VI-K and 3-VI-L.

J. Insert gas tool into rear of arm, **(Figure 21)** and turn clockwise 16 revolutions.

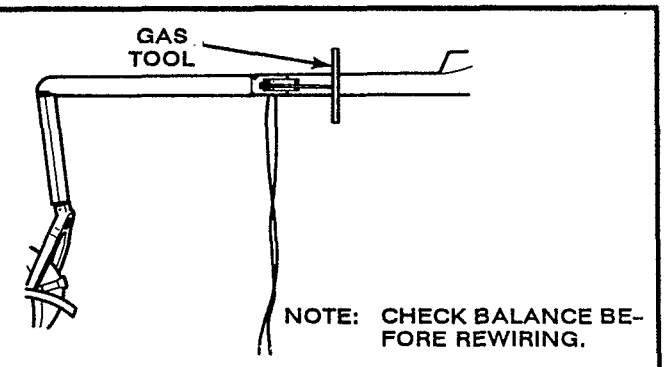


FIGURE 21 - ACTIVATING THE GAS SPRING

K. Temporarily attach light head and arm, then check balance of light. Adjust, using gas tool if necessary.

NOTE: Equal force (or up to twice as much force DOWN) should be required to move light up or down.

L. Route wires back through arm (as previously installed, ensuring wires are in channels) to head, replacing knuckle cover. Do not pinch wires.

CAUTION: **Inspect rewiring carefully to prevent damage to wire, especially at arm joints.**

M. Replace position screw **(Figure 19)**.

N. Remount light head and yoke cover.

VIII. REPLACE GAS SPRING IN TRACK MOUNT LIGHT

A. Disconnect all power to light.

B. Pull out dimmer switch, locate and remove two wire nuts from wires leading from front arm **(Figure 22)**. Pull out wires.

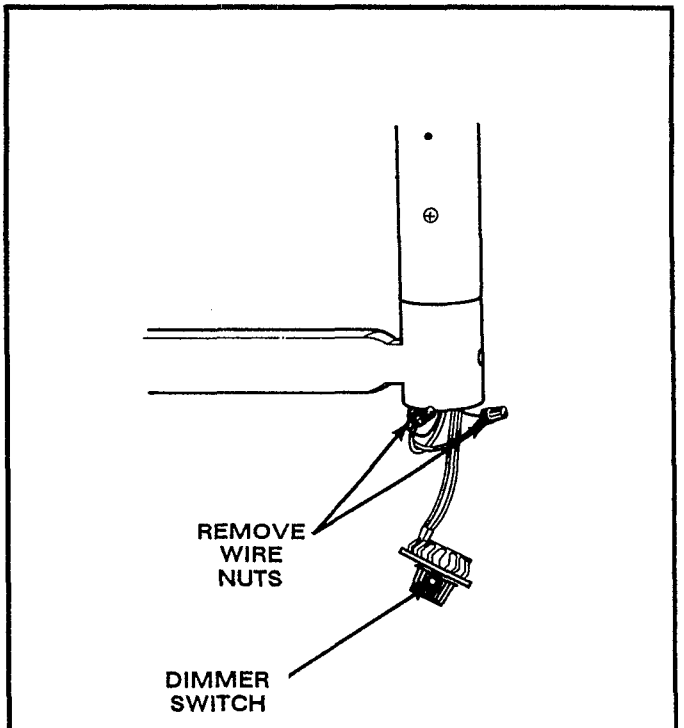


FIGURE 22 - DISCONNECTING WIRES

C. Straighten arm as in **Figure 23**, and insert gas tool (provided) through hole in column to engage gas spring. Turn counterclockwise until arm tension is relieved (pressure is released), plus four extra turns.

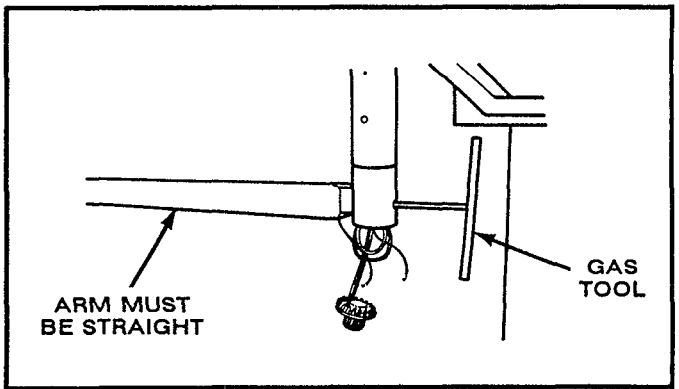


FIGURE 23 - RELEASING PRESSURE ON GAS SPRING

WARNING: **Ensure pressure has been released from gas spring.**

D. Remove four screws from underside of arm.

E. Punch out pin as shown in **Figure 24**, allowing arm to come off.

NOTE: Pin is designed to permit removal or insertion in one direction only. Push from side with flats on pin.

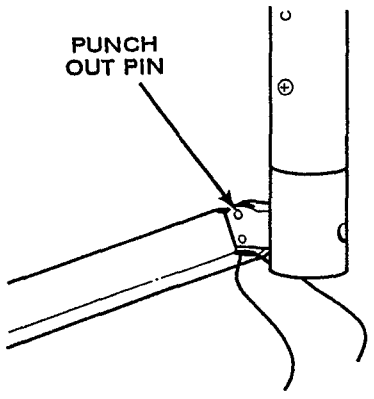


FIGURE 24 - REMOVING PIN

F. Slide cover off arm and replace gas spring. Refer to **Figure 14** for a similar replacement procedure.

NOTE: Examine position of wiring for reassembly.

G. Perform procedure in Section 3-VI-L and 3-VI-M. (Figures referred to in these sections show similar, not exact, operations.)

H. Check balance of light. Adjust (using gas tool) if necessary.

NOTE: Equal force (or up to twice as much force DOWN) should be required to move light up or down.

I. Route wires back to knuckle (as previously installed), ensuring wires are in grooves. Do not pinch wires.

CAUTION: **Inspect rewiring carefully to prevent damage to wire, especially at joints.**

IX. REPLACE GAS SPRING IN WALL MOUNT LIGHT

A. Disconnect all power to light.

B. Pop out cap, locate and remove two wire nuts (**Figure 25**). Pull out wiring as indicated.

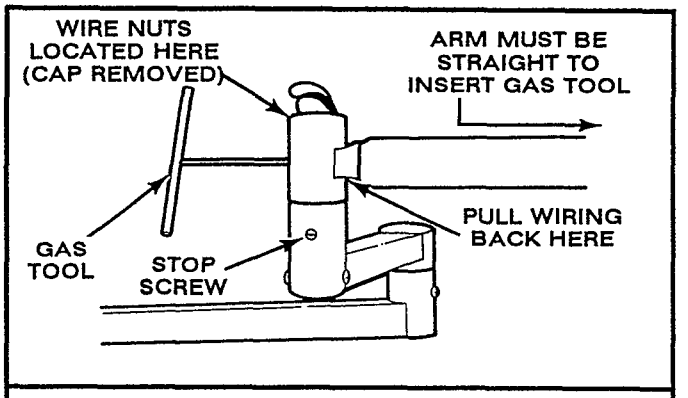


FIGURE 25 - RELEASING PRESSURE ON GAS SPRING

C. Straighten arm as in **Figure 25**, and insert gas tool through hole to engage gas spring. Turn counterclockwise until arm tension is relieved (pressure is released), plus four extra turns.

D. Follow procedure described in Section 3-VIII-E through 3-VIII-J for two arm LFWII only. The three arm LFWII and LFLII should follow procedure described in Section 3-VI-L through 3-VI-Q.

X. REPLACE FRONT ARM

A. All Models

- Remove the yoke cap retained by four screws (**Figure 4**).
- Remove two wire nuts attached to two wires coming from front arm (**Figure 5**).

B. Head Removal

1. Models LFII, LFLII, LFWII (3) Only

- Loosen the two set screws in yoke near snubbing pins (**Figure 4**).
- Remove top and bottom snubbing pin (**Figure 5**), and slide the yoke and head assembly out of the knuckle.

2. Models LFCII, LFCII-D, LFTII, LFTII-D, LFWII (2) Only

- Remove the down arm/yoke head assembly from the front knuckle by removing two screws (**Figure 18**).

C. Front Arm Removal

1. Models LFWII (2), LFWII (3), LFLII Only

- Remove cap from top of rear knuckle (**Figure 25**). Remove two wire nuts attached to two wires coming from front arm.
- Remove the stop screw from the rear arm joint (**Figure 25**). Lift the front arm out of the rear arm.

2. Models LFTII, LFTII-D Only

- Pull out the dimmer control from the rear knuckle (**Figure 1**). Remove two wire nuts attached to two wires coming from the front arm.
- Remove the stop screw and the set screw in the arm mounting collar (**Figure 1**). Unscrew the arm mounting collar from the column (counterclockwise) as viewed from below.
- Disconnect the two exposed Mate-n-Lok® connectors, which permit arm removal.

3. Models LFII, LFCII, LFCII-D Only

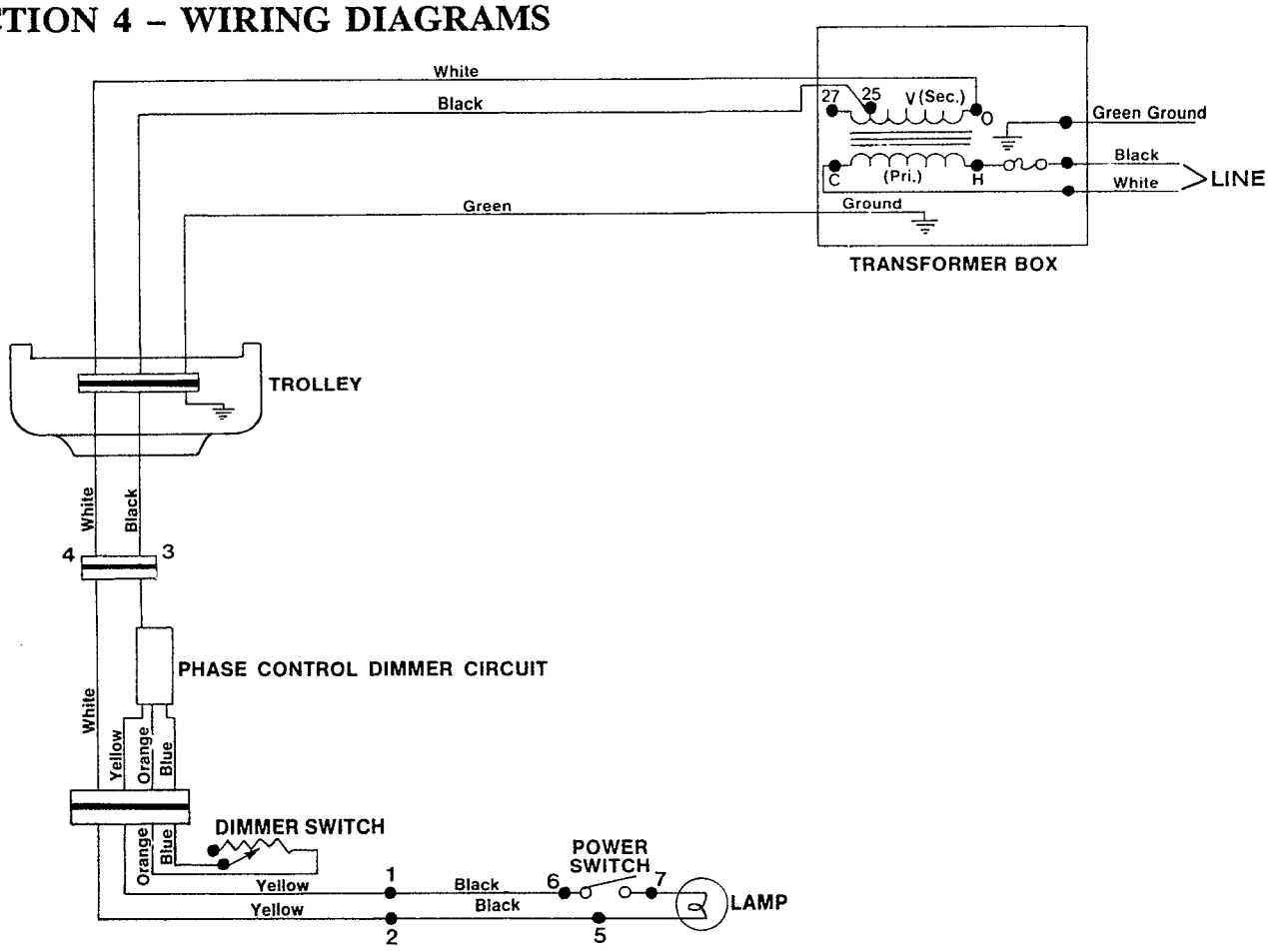
- Loosen the two set screws in the arm adapter near the snubbing pins (**Figure 7**).
- Remove the top and bottom snubbing pin and slide the front arm off the arm adapter.

D. All Models

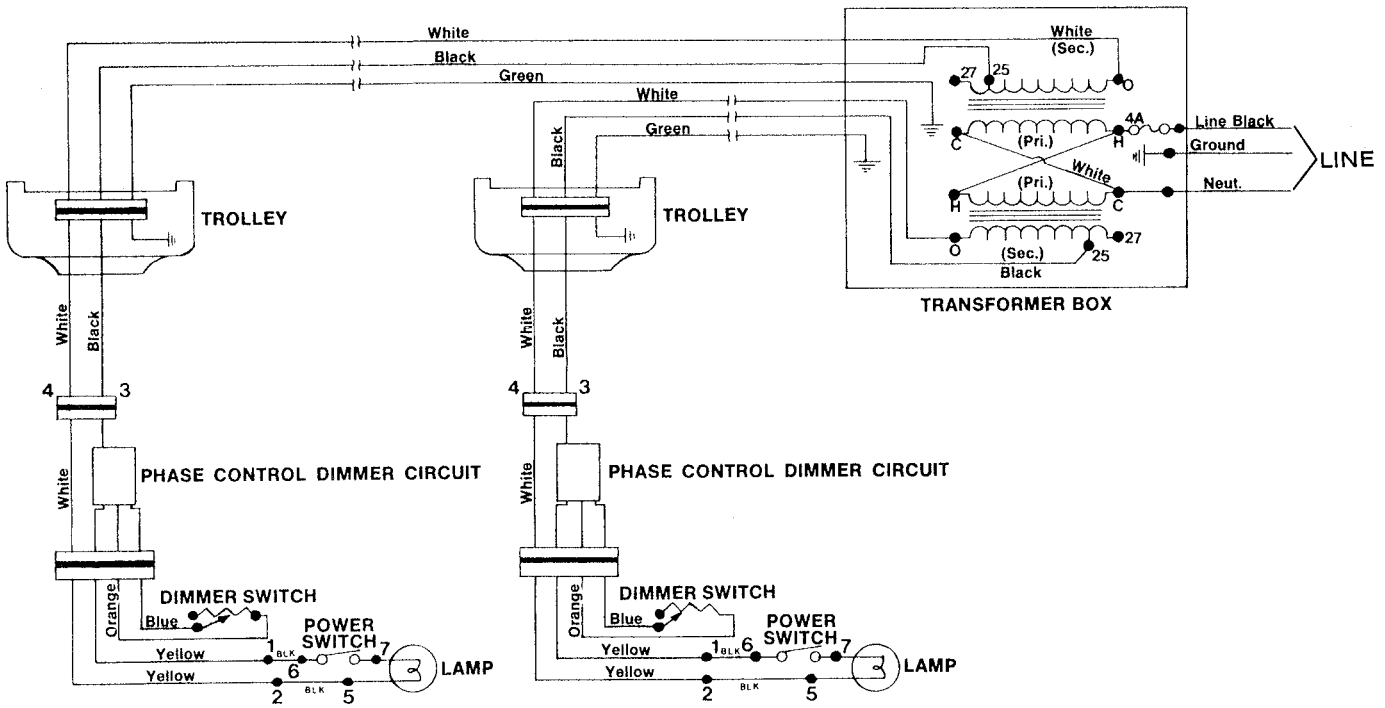
- Reverse procedure for installing new arm.

NOTE: For arm balance adjustment, refer to LFII Installation and Adjustment Instruction, YL3-096035.

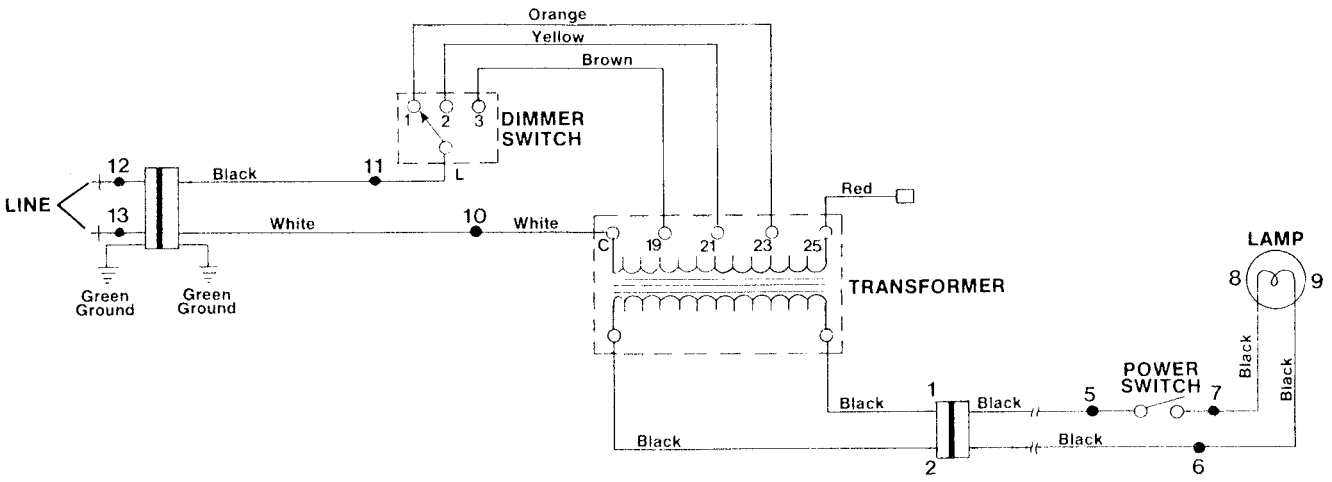
SECTION 4 – WIRING DIAGRAMS



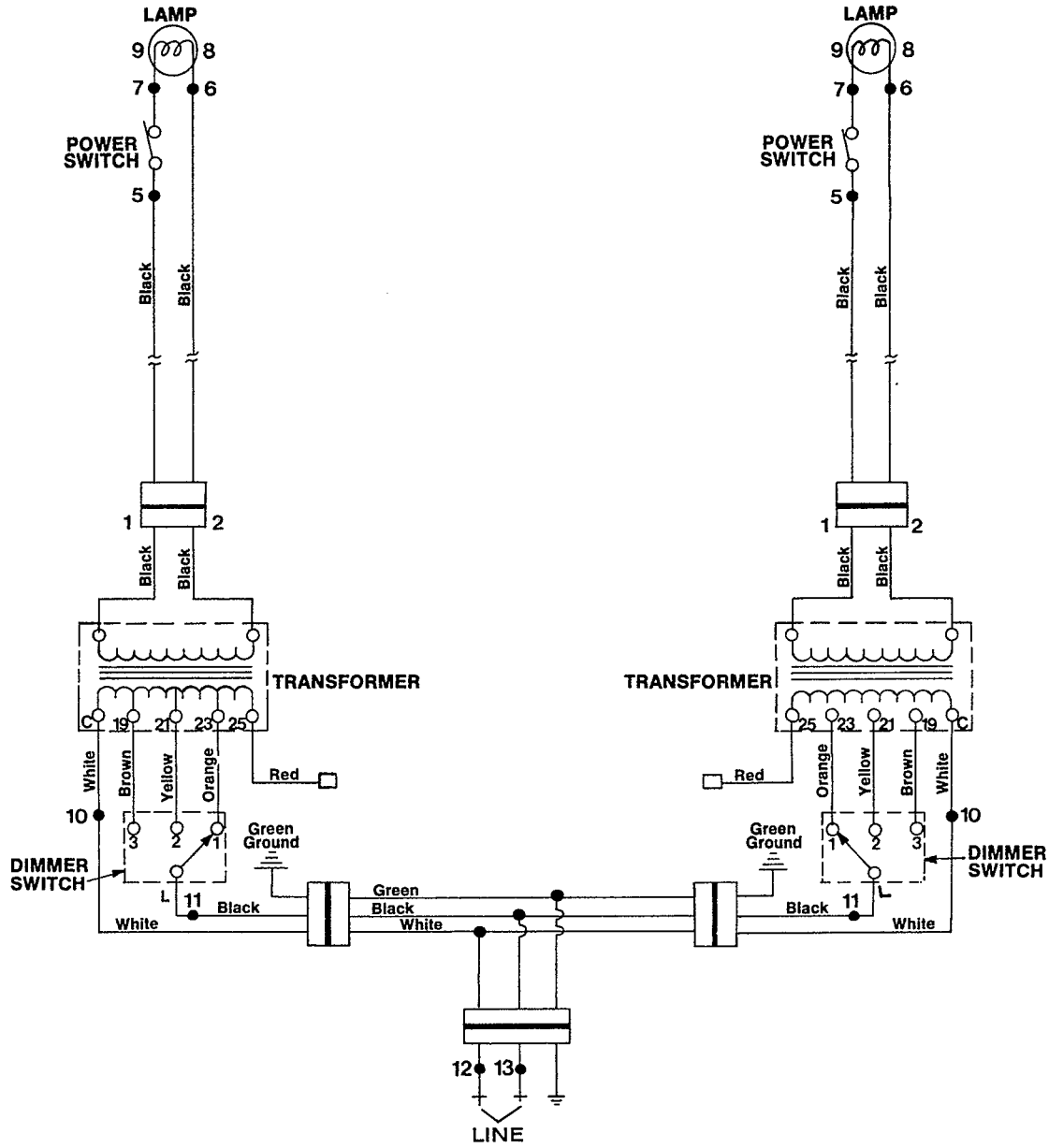
LFTII Track Light



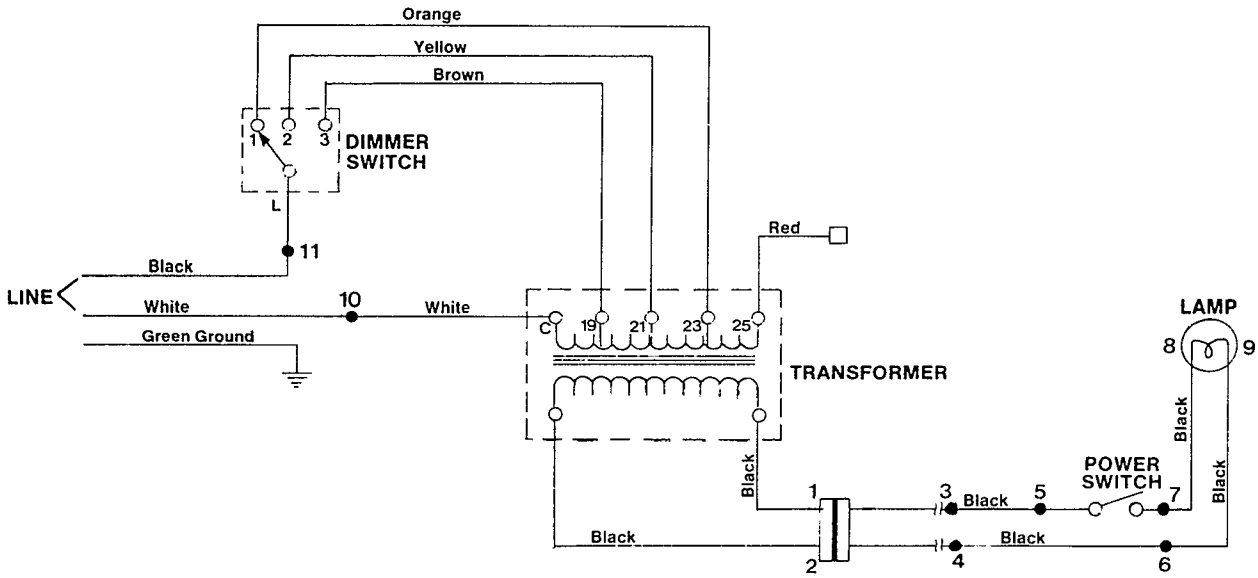
LFTII-D Dual Track Light



LFCII Column Light



LFCII-D Dual Column Light



LFII Unit Light, LFLII Lab Light, LFWII(2) and LFWII(3) Wall Light